NEWBURY 8000 SERIES

8009 VISUAL DISPLAY TERMINAL

OPERATOR INSTRUCTION MANUAL

MP MASTER
MA23745

NEWBURY LABORATORIES LIMITED

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Introduction

This manual provides all necessary information to enable operators to set up/modify the required functions of the Newbury Model 8009 Visual Display Terminal.

Power On/Off

The Power On/Off switch is located on the left hand side of the terminal, at the rear. The switch is a toggle type which illuminates to indicate POWER ON. On initial Switch On, a bell on the keyboard will sound and after a period of approximately 20 seconds the cursor will appear.

Contrast

The intensity of the display is varied by means of a contrast control located to the left of the screen. The control is a slider type and the operator's optimum contrast is achieved by moving the control up and down. Brilliance and focus are set internally to their optimum settings.

External Video

A composite video socket is provided for connection to an external monitor.

Interfaces

There are three interfaces provided:

(1) V24, RS232 line.

(2) 20-60mA current loop.

(3) V24, RS232 printer.

Note:
The V24 line and 20-60mA current loop interfaces are on the same 25-way 'D' type cannon plug. The terminal is normally supplied with a V24 interface cable: there is an optional current loop cable available (not normally supplied).

Display

The display is 25 lines by 80 characters, each character cell occupying a 7×11 dot matrix. The top line is not always displayed and is referred to as the STATUS LINE, or a SOFT CODE OPTION LINE.

The cursor is a white rectangle which when placed over a character inverts the character.

Character Set

The character set is a standard 96 character ISO, which in conjunction with the CAPS key can be reduced to a 64 ASCII character set.

The Keyboard

The keyboard has a teleflex cable with a 5 pin DIN plug attached. This cable must be inserted in the mating socket at the rear of the terminal before the terminal is switched on.

The keyboard is upper and lower case to ISO standards.

It is switchable to ASCII by means of a CAPS key.

There are both coded keys and non-coded keys. The coded keys send out codes to the line, the non-coded keys carry out certain functions within the VDU.

Coded Keys

Depression of a coded key generates the appropriate character, which may or may not be transmitted to line, this being dependent on the state of the VDU.

The code that is generated by the key is dependent on the state of SHIFT or SHIFT LOCK, CONTROL and CAPS.

Non-Coded Keys

CARRIER LAMP
This shows the state of the CARRIER. If a 'CARRIER' is detected on the line, then the lamp will be illuminated.

LOCAL
Puts the VDU into a LOCAL state; no information can be sent to or received from the line in this mode. RQTS goes to a negative level.

RESET
This resets the VDU. This is normally only used if the VDU is 'locked up' during a transmit from the screen. The cursor returns to the home position on RESET.

TTY CAPS
Puts the VDU into 'CAPITALS' mode. In this mode no lower case characters can be transmitted from the keyboard, only the upper case equivalents are sent—i.e. Codes 60H to 7EH are converted to 40H to 5EH.

CONTROL
Converts certain coded keys to a 'control code'.

SHIFT or SHIFT LOCK
Shifts certain coded keys.

REPEAT
When used in conjunction with coded keys, repeats that key at a rate of 25 characters per second.

BREAK
Places a 'SPACE' on the line for 0.5 seconds. This will also have an effect on 'RQTS' if used with 2-wire handshake option.

Page Selection

Apart from the OPTION page there are seven separate display pages, called page 1 to 7. On SWITCH ON page 1 is displayed. The other pages can either be selected from the line or from the keyboard by means of an ESCAPE SEQUENCE, i.e. ESCAPE followed by 1 to 7 selects pages 1 to 7. The pages can also be selected locally from the keyboard by depressing CONTROL + (1 to 7), for pages 1 to 7 respectively (NOT NUMERIC PAD).

Each page works completely independently with regard to cursor position and attributes. If an unrecognised escape sequence is sent to the terminal, then the character which follows the escape is recognised. If the selected option page is already selected then the following character is not printed. If an escape sequence changes the page the corresponding character is not printed.

Default Condition

If RESET is held down on Switch On, the terminal configures itself to it's DEFAULT options.

Writing Characters

All received characters from the line or from the keyboard are written at the cursor position, the cursor then moving one position to the right.

When the 'bell position' is written to, 'a bell sounds', to inform the operator that the end of the line is approaching. The bell position can optionally be set to any character position from 0 to 79.

When the 79th position is written to (counting from 0), the cursor blinks in position 79. This is referred to as position 80. The following character is then written in position 0 on the line below.

IN PAGE MODE
If the cursor is in position 80 on the bottom line, the following character will be written in the home position.

IN ROLL MODE
If the cursor is in position 80 on the bottom line, the next character causes a ROLL, and then appears in position 0 on the bottom line.

Protected Fields

If a character attempts to overwrite a protected character (with protect on) then the cursor moves to the end of the protected field. If a protected field 'wraps around' a line, then the cursor goes to the end of the field, not to the end of the line.

If a protected field ends at position 79, then the cursor moves to position 0 on the next line.

If a protected field ends at position 79 on the bottom line, the cursor will go to the end of the screen (character 79, line 24).

Normally the cursor can never rest in a protected position and if a cursor movement could cause this to happen, then the screen will be searched from that position to the end of the screen until an unprotected position is found. If no such position exists then the cursor goes to the end of the screen (character 79, line 24).

However, an option exists to allow the cursor to be positioned in a protected field for the following commands only: HOME, RETURN and X-Y ADDRESS.

Note:
With this option selected, protected characters still cannot be overwritten.

Edit

Places the VDU in EDIT mode. In this mode characters typed from the keyboard do not go to line. Only the functions SEND LINE, SEND PAGE, ANSWER BACK or REQUEST X-Y causes data to be transmitted to line.

Print Line

Depress PRINT and SEND LINE.

This is the same as SEND LINE (see CONTROL CODES), except that the data is sent to the Print port and the terminators are CARRIAGE RETURN, NULL, NULL, NULL, NULL, LINE FEED. This terminates the function.

The data is transmitted at a rate dependent on the TX&RX PRINT SPEED OPTION, the parity and the number of stop bits (1 or 2), is determined by the respective option in the PRINTER PORT OPTIONS.

Protected fields are always sent as normal data, also embedded nulls are always sent as spaces.

Nulls to end of line are ignored.

All data received from the line, in this mode, is queued.

Print Page

Depress PRINT and SEND PAGE.

As PRINT LINE, except that all the page is sent. The terminators being CARRIAGE RETURN, NULL, NULL, NULL, NULL, LINE FEED.

On transmission of these terminators at the end of the bottom line, the function terminates.

During a printing process pin 20 on the printer is used to indicate a 'BUSY'. If pin 20 goes to negative level a 'BUSY' is detected, and no more data is transmitted to the printer until pin 20 goes positive.

Note that pin 4 behaves the same way as pin 20 and is internally connected to pin 20.

Page/Roll
This will override the state of ROLL and PAGE when depressed or released.

Status Line, Option Page
These operator selectable variables are held in battery back-up CMOS RAM, within the terminal.

On SWITCH OFF the terminal 'Remembers' its selected options.

When the terminal is switched on, a Sum Check is carried out to see if any of the options have been corrupted. If corruption is found the BELL will sound an extra three times. The operator must then check all the options; it is therefore suggested a record is kept of these options.

Status Line
When CONTROL and TAB are depressed the STATUS LINE will appear on line 0 above the top line of the normal 24 line display. The current option settings are displayed.

No code is sent to line, and all received codes are ignored during this process.

Only four keyboard actions are recognised: RETURN, TAB, ESCAPE and REPEAT.

The cursor is positioned at the start of the first option value.

CARRIAGE RETURN
The option value currently displayed at the cursor position is replaced by an alternative value. Repeated use of this key will cycle through all permitted values.

TAB
Causes the cursor to move to the next alternative value. If the cursor is currently at the end of the last line it will move to the first value on the STATUS LINE.

ESCAPE
The STATUS LINE is removed and the cursor is repositioned to where it was before the STATUS LINE was invoked and the process is terminated.

REPEAT
When used with CARRIAGE RETURN will cycle through all values for THE CURRENT OPTION. When used with TAB will cycle through ALL OPTIONS.

OPTION 1
This defines the transmit speed and transmit parity. Possible speeds are given at the end of this options description. Parity may be: ODD, EVEN, MARK or SPACE.

Example: TX= 2400 EVEN;

Indicates that the transmit speed is 2400 Baud with even parity.

OPTION 2

This defines the receive speed and the receive parity. Possible speeds are given aty the end of this options description. Parity may be ODD, EVEN, MARK, SPACE or IGNORE.

Example: RX= 2400 IGNORE;

Indicates that the receive speed is 2400 Baud with parity ignored.

OPTION 3

This defines whether the terminal is to operate in FULL or HALF DUPLEX.

Example: HALF DUPLEX;

Indicates that the terminal is set to Half duplex operation.

OPTION 4

This defines whether the line interface is 2- or 4-wire.

Example: 2 WIRE;

Indicates that the terminal is set to operate on a 2-wire line.

OPTION 5

This defines the 'Bell Position' which will cause the bell to sound when the corresponding character position is written to. Possible values are in the range 00 to 80. If the value is 80 then there is no bell position.

Example: BELL= 72;

Indicates that the bell will sound when the 72nd position is written into.

OPTION 6

This defines whether Rubouts are to be displayed (value is Y) or ignored (value is N).

Example: DELETE= N;

Indicates that the code 7Fh does not produce a symbol on the display.

OPTION 7

This defines whether NEW LINE is to be LINE FEED code, CARRIAGE RETURN code or ignored.

Example: NL= CR;

Indicates that on receipt of the CR code (0Dh) a new line operation will take place.

OPTION 8

This defines whether pages are selectable or not. Values are 1 or 7.

Example: PAGES= 1;

Indicates that there is only one displayable page available.

Transmit, Receive and Print Speeds

There are 16 possible Baud rates:

50, 75, 100, 110, 134.5, 150, 200, 300, 400, 600, 1200, 1800, 2400, 4800, 9600, 19200.

Option Page

When CONTROL and HOME are depressed together—with the terminal already in the EDIT mode—the currently displayed page is replaced by the OPTION PAGE, and STATUS LINE is also displayed. The cursor is positioned at the start of the first option value of the STATUS LINE. All current options are displayed.

No code is sent to line and all received codes are ignored during this process.

The OPTION PAGE consists of several lines defining various options and two lists of control code values (in hexadecimal). The two control code lists show which codes are to be ignored when received from the keyboard or from line, respectively. Codes which are to be ignored are underlined.

Only four keyboard actions are recognised: RETURN, TAB, ESCAPE and REPEAT.

CARRIAGE RETURN
The option value currently displayed at the cursor position is replaced by an alternative value. Repeated use of this key will cycle through all permitted values.

TAB
Causes the cursor to move to the next alternative value. If the cursor is currently at the end of the last line it will move to the first value on the STATUS LINE.

ESCAPE
The page which was being displayed before the OPTION PAGE was invoked is restored to the screen and the STATUS LINE is removed—the cursor position is not affected.

REPEAT
When used with CARRIAGE RETURN, will cycle through all values for the CURRENT OPTION. When used with TAB, will cycle through ALL OPTIONS.

CLEAR OPTION
This defines whether the screen is cleared from HOME or from the cursor. Values are HOME and CURSOR.

Example: CLEAR FROM CURSOR

Indicates that a CLEAR command will cause data to be cleared from the cursor to the end of the screen.

CURSOR SKIP OPTION
This defines whether or not the cursor is permitted to rest at a protected position following a HOME, RETURN or X-Y ADDRESS control. Values are ON and OFF.

ON means that the cursor will always skip out of a protected field. OFF means that the above three controls may move the cursor to a protected position.

Example: CURSOR SKIP= ON

SOFT CODE OPTiON
The numeric keys of the numeric pad can either be used to type numbers or they can have a sequence associated with them. The numbers are available if the OFF selection is made. If the ON option is made then a sequence of up to 16 characters is enabled.

Example: SOFT CODES= ON

In order to program these special keys Control + the Numeric key required is depressed. The top line then displays NUMERIC PAD X = ... , where X is a number 0 to 9.

By depressing the required character on the keyboard, it is inserted in the sequence and the cursor moves to the next available position.

Control codes are inserted by depressing the CONTROL key plus the required character, or CONTROL key plus the function key, ie. CONTROL + J or CONTROL + LINE FEED. They are displayed as underline characters, ie. CONTROL + J is displayed as underline + J = OAH.

The DEOL key is used to delete all redundant data from the cursor to the end of the sequence.

The → key is used to move the cursor to the desired character position.

When the sequence is correct the ESCAPE key or the RESET key is depressed, the top line then disappears.

Up to 16 characters are available for each key.

Numeric 0 is also associated with an answerback sequence, see CONTROL CODES.

UNDERLINE OPTION
An Underline may be associated with the control code 12H, ie. after this code is received by the terminal the following data may appear as Underlined. If ON is selected then the Underlines are written, if OFF is selected they are not.

Example: UNDERLINE= ON

PROTECT OPTION
This decides whether Protected fields can or cannot be displayed on the screen. The options are ON or OFF.

If ON is set then Protected fields are enabled, if OFF is set then Protected fields are disabled.

Example: PROTECT= OFF

TRANSMIT FROM SCREEN OPTIONS

FROM CURSOR (HOME)
This decides when a page of information is to be transmitted from the screen, whether the transmission is to be started from the CURSOR or from the HOME position.

Example: FROM HOME

NULL= SPACE
This decides whether embedded nulls, ie. areas that have never been written into, are transmitted as SPACE codes or IGNORED during a transmission from screen.

Example: NULL= SPACE

PROTECTED FIELD
If a Protected field is encountered during a transmit from screen then an option of either transmitting a TAB code or sending nothing (IGNORE) is available.

Example: PROTECTED FIELD= IGNORE

LINE TERMINATORS= CR LF
This decides whether at the end of a line, during a transmit from screen, either a CARRIAGE RETURN or a CARRIAGE RETURN LINE FEED is sent to line. Whatever the selection made LF (line feed) has to be received by the terminal before the next line can be transmitted.

PAGE START CODE
When transmitting a page of information to the line, an initial code can be sent to line before the text to be transmitted. The code can be either STX or SOH. The other option is that no code is sent at all, ie. BLANK.

Example: PAGE START CODE= STX

PAGE STOP CODE
At the end of a transmit page an optional code can be sent to line. The code can be either EOT or ETX. The other option is that no code is sent, ie. BLANK.

PRINTER PORT OPTIONS

XON XOFF OPTIONS
These options are only relevant when the printer is working in conjunction with PRINT ON and PRINT OFF. See relevant section.

Example: XON= 11H XOFF= 13H

The range for both these options is 00H to 1FH or OFF for ignore.

HOST ECHO
This is used in conjunction with XON XOFF, see PRINT ON.

Example: HOST ECHO OFF

The other option is ON.

PRINT AND DISPLAY
When PRINT ON has been initiated, there is an option to send the data to the printer only or the printer and the screen (PRINT AND DISPLAY).

Example: PRINT ONLY

The information is sent to the printer only.

TX&RX SPEEDS
The choice of printer speeds is the same as the line.

Example: 2400

The printer is transmitting at 2400 Baud and is expecting received data at 2400 Baud.

PARITY
The printer transmit parity can be ODD, EVEN, MARK or SPACE. The receive parity is always ignored.

Example: EVEN

STOP BITS
The printer can either transmit 1 or 2 STOP bits.

Example: STOP BITS= 2

CONTROL CODES IGNORED
There are two lists of control codes (in hexadecimal). The first represents codes from the keyboard and the second represents codes received from the line. Codes which are underlined are ignored from the corresponding source.

Example: CONTROL CODES IGNORED (HEX)
FROM KEYBOARD
00 01 02 .... 0D 0E 0F
10 11 12 .... 1D 1E 1F
FROM LINE
00 01 02 .... 0D 0E 0F
10 11 12 .... 1D 1E 1F

OPTION PAGE

Example:
TX= 19200 EVEN; RX= 19200 IGNORE; HALF DUPLEX; 4 WIRE;
BELL= 72; DELETE= Y; NL= NO; PAGES= 7

CLEAR FROM CURSOR
CURSOR SKIP= OFF
UNDERLINE= OFF
SOFT CODES= OFF
PROTECT= OFF

TRANSMIT FROM SCREEN
FROM CURSOR
NULL= SPACE
PROTECTED FIELD= TAB
LINE TERMINATORS= CR LF
PAGE START CODE= STX
PAGE STOP CODE= ETX

PRINTER PORT

XON= 11H XOFF= 13H HOST ECHO OFF

PRINT ONLY

TX&RX= 19200 PARITY= EVEN

STOP BITS= 2

CONTROL CODES IGNORED (HEX)

FROM KEYBOARD

00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F

FROM LINE

00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F

Interfaces

There are three interfaces:

V24 Line, V24 Printer and Current Loop Line.

V24, RS232 Line Port

This is a 25-way 'D' type cannon plug on the rear of the VDU.

The pins are connected as follows:

Pin 1 Unused
Pin 2 Transmit data
Pin 3 Receive data
Pin 4 Request to send
Pin 5 Ready for sending
Pin 6 Data set ready
Pin 7 Ground
Pin 8 Carrier
Pin 9 Unused
Pin 10 Unused
Pin 11 Data signalling rate selector
Pin 12 Unused
Pin 13 Unused
Pin 14 Unused
Pin 15 Unused
Pin 16 Unused
Pin 17 Unused
Pin 18 Unused
Pin 19 Unused
Pin 20 Connect data set to line
Pin 21 Unused
Pin 22 Unused
Pin 23 Unused
Pin 24 Unused
Pin 25 Unused

TRANSMIT DATA Pin 2
This circuit transmits serially encoded characters and break signals and is held in the Mark state when idle.

RECEIVE DATA Pin 3
This circuit receives serially encoded characters generated by the user's equipment.

REQUEST TO SEND Pin 4
RQTS can be selected to operate on a 2- or 4-wire system.

2 WIRE RQTS is normally at a negative level and only goes positive during a transmit from the VDU. It remains positive until the character associated with it is transmitted.

4 WIRE RQTS is always at a positive level.

If DSR goes negative, RQTS will also go negative.

RQTS is also dependant on LOCAL; if the terminal is in LOCAL, RQTS will be negative.

READY FOR SENDING Pin 5
If negative stops data being transmitted.

DATA SET READY Pin 6
See Request to Send.

GROUND Pin 7
This conductor establishes the common ground reference potential for all voltages on the interface.

CARRIER Pin 8
If positive causes the CARRIER lamp to illuminate.

DATA SIGNALLING RATE SELECTOR Pin 11
This is negative for speeds of 600 Baud and below and high for all others.

DATA TERMINAL READY Pin 20
This will be positive when the terminal is on line, ie. not in LOCAL; in LOCAL it will go negative.

Current Loop (20mA-60mA)

The same 25-way 'D' type cannon plug as used for the V24 is used for Current Loop. However, a different cable is used for Current Loop, which only has the following connections:

Pin 7 OV
Pin 10 Receive positive
Pin 14 Receive negative
Pin 16 +12V (via 220 OHM resistor)
Pin 18 Transmit positive
Pin 19 Transmit negative
Pin 21 Inhibit (connect to OV for Current Loop)

A current of between 20mA and 60mA can be used with Current Loop.

The minimum current being 16mA.

A maximum Baud rate of 9600 is available.

V24, RS232 Printer Port

This is a 25-way 'D' type cannon socket on the rear of the VDU.

The pins are connected as follows:

Pin 2 Receive data
Pin 3 Transmit data
Pin 4 Printer busy
Pin 7 OV
Pin 8 +5V (via 1k0 OHM resistor)
Pin 20 Printer busy

RECEIVE DATA Pin 2
Serially encoded data from the printer is received on this circuit.

TRANSMIT DATA Pin 3
Serially encoded data is sent to a printer on this circuit; it idles in a Mark state.

PRINTER BUSY Pins 4 & 20
A negative level on this circuit stops any data going to the printer.

Video Output

A 1V into 75 OHM composite video output is provided to connect to a free standing monitor. This signal is to CCIT standards.

Speed of Communication

The VDU can operate at speeds up to 19200 Baud. Characters and certain control codes can operate at this speed. However, there are certain control codes which are time consuming operations; these will cause a line buffer to fill if codes are input during these operations.

Examples:
Insert line
Delete line
Insert character
Delete character
Tab-through protected fields
Delete to end of line
Clear
Roll

Any functions which cause the cursor to move into a protected field, can cause the buffer to fill whilst the cursor is tabbing to the end of the field.

Control Codes

NULL 00H
When received by the VDU no action occurs.

INSERT LINE 01H
With Protect Off or Protect Set—All character lines from the cursor line downwards move down one line. The cursor line becomes cleared (to NULLS), the bottom line is lost. The cursor moves to the start of the cleared line.

With Protect On—No action occurs.

DELETE LINE 02H
With Protect Off or Protect Set—All character lines below the cursor line move upwards one line, the old cursor line being lost, and the last line (line 24) being cleared to NULLS. The cursor moves to the start of the line that replaces the old cursor line.

With Protect On—No action occurs.

REQUEST X-Y CO-ORDINATES 03H
On receipt of the REQUEST X-Y code, the X and the Y co-ordinates are sent to line, these co-ordinates both being referenced to the space code, ie. the home position being Space, Space.

In full duplex mode, the co-ordinates have to be echoed back in the correct order and correctly, otherwise the cursor moves to a position determined by the X-Y procedure.

In half duplex the echoes are internal and no cursor movement occurs since the echoes are automatically correct.

ANSWERBACK 04H
An answerback associated with the SOFT CODE OPTION on numeric pad key 0, is activated by this code. The sequence is independent of the SOFT CODES option, and in full duplex does not require echoes.

BACKGROUND ON 05H
All displayable characters which follow this control code are displayed with their Background attribute set.

BACKGROUND OFF 06H
All displayable characters that follow this control code are displayed without their Background attribute bit set.

BELL 07H
Causes an audible alarm on the keyboard to operate.

CURSOR LEFT 08H
With Protect Off or Protect Set–Causes the cursor to move one character position left. If the cursor is at the left hand end of a line, the cursor moves to the right hand end of the line above (character 79) unless the cursor was at the left hand end of the top line (home position), in which case it moves to the right hand end of the bottom line.

With Protect On–This causes the same action as without protection unless the new position is protected. In this case the cursor does not move.

TAB 09H
With Protect Off or Protect Set–Causes the cursor to move to the right to the next tab stop, the tab stops being 0, 8, 16, 24, 32, 40, 48, 56, 64, 72 and 80. When the cursor in in position 80, no action occurs.

With Protect On–Causes the cursor to move to the start of the next unprotected field. If there is no such position on the screen then the cursor goes to the last position on the screen (character 80, line 24).

LINE FEED 0AH
Cursor Down with Protect Off or Protect Set–Moves the cursor down one line, without horizontal movement. If the terminal is in PAGE mode (see SET PAGE) and the cursor is on the bottom line (line 24), it will move to the same character position on the top line (line 1).

If the terminal is in ROLL mode (see SET ROLL) and the cursor is on the bottom line, all data on the screen will move up one line and the original top line will reappear at the bottom of the screen (line 24) with all characters replaced by nulls. The cursor will not move; this is a ROLL operation.

With Protect On–This causes the same action as without protection unless the new position is protected. In this case the cursor tabs to the next unprotected area. If no unprotected position is found the cursor will go to the last position on the screen (character 80, line 24).

If a Roll is attempted with protected areas displayed the following will occur. The screen will Roll, the old top line having all its unprotected data cleared to nulls, any protected data on that line appearing on the new bottom line as protected data in its previous horizontal position.

CURSOR UP 0EH
With Protect Off or Protect Set–The cursor moves up one line, without horizontal movement. If the cursor is on the top line, it moves to the same character position of the bottom line.

With Protect On–This causes the same action as without protection unless the new position is protected. In this case the cursor will move into the protected area and immediately tab to the next unprotected position. If no such position is found the cursor will go to line 24, character 80.

SEND PAGE 0CH
Causes all characters from the home position, or from the cursor (option) to the end of the page, to be transmitted to line. There is an optional initial code (STX or SOH) see options, which preceeds the data.

After each line has been transmitted, ie. the end of the line is reached or trailing nulls are reached, the LINE TERMINATORS are sent. The terminators are CARRIAGE RETURN or CARRIAGE RETURN & LINE FEED.

After line feed has been received by the terminal, the next line is sent. If during the transmission embedded nulls are encountered in the text, these can either be ignored or sent as spaces (option).

If protected fields are encountered during transmission of text, the protected field will be tabbed through and an optional TAB code sent to line.

When the last line of text has been transmitted, there is an optional terminator (EOT or ETX) which can also be transmitted. When this terminator has been received by the terminal (or line feed if option not selected), the transmission is complete and the cursor returns to the home position.

If in full duplex operation and an incorrect echo occurs while sending the printable characters, then a delete symbol '(see manual) appears on the screen where the error occurred; the cursor remaining at the error position and the sequence is terminated.

In full duplex operation the transmission rate is determined not only by the Baud rate, but also by the 'echo rate'.

Note that in EDIT mode the send page code is not sent to line, but out of EDIT mode the send page code is sent to line.

CARRIAGE RETURN 0DH
The cursor moves to the left hand end of the line. If protected data is present at that position the cursor will move to the next unprotected position or to the end of the page if there is protected data to the end of the page (character 80, line 24). See CURSOR SKIP option.

DELETE CHARACTER 0EH
The character at the cursor position is removed from the screen and characters to the right of the cursor are shifted one position left to fill in the gap. All characters from the cursor position to the first protected character to the right of the cursor, or to the end of the line, move left, and a null character will be placed in the vacant gap to the left of the protected character or at the end of the line (character 79).

INSERT CHARACTER 0FH
All characters, including the cursor position character, up to a protected field or the end of the line, are shifted one position right. The character which was to the left of the protected character or was in position 79 will be lost, and the gap created at the cursor position will be a null. If the cursor is in character position 80, there will be no action.

PRINT ON 10H
On receipt of the Print On code, data from the line or from the keyboard (in half duplex, edit) is sent to the printer port. There is an option of printing ONLY or printing and DISPLAYing. When printing and displaying SEND LINE and SEND PAGE codes are ignored by the terminal, but are sent to the printer.

If the printer goes Busy (ie. pins 4 or 20 go negative on the printer port), the printer port will stop sending data to the print port and incoming data will be buffered.

In order that information should not be lost because of buffer overfill, there is an optional X ON, X OFF sequence, ie. when the buffer approaches its full state X OFF is sent to line. The system recognises this code (see note) and stops sending data. When the buffer has released its information (ie. the printer Busy has dropped) then an X OFF is sent to the line, the system then continues sending its data.

There is also a means of suppressing any possible echo of the X ON, X OFF codes, ie. if the system echoes these codes in order that the codes are not interpreted by the terminal.

HOST ECHO OFF means that the system does not echo the code, so do not ignore any echo.

HOST ECHO ON means that the system does echo the code, so ignore the echo.

When the printer and line are working at different speeds, this may cause the printer buffer to fill, ie. if line speed > printer speed.

The X ON, X OFF sequence may also be used to stop data loss.

PRINT OFF
This code stops data being sent to the printer port.

Bi-directional Print Port

The print port is bi-directional, ie. data can flow in either direction. Data from a printer will always go to line, if the terminal is on line. Data will go to the display if the terminal is in half duplex or edit. If the terminal is in local then data from the print port will be ignored. Any echo to the printer port is always from the line.

Note:
This feature is independent of Print On.

The following codes (12H, 13H, 14H) can be either associated with underline or protected areas, or any combination of these. There uses are described separately.

PROTECT SET 12H
Turns the SET PROTECT flag on. All subsequent characters are then protectable, but do not become protected until PROTECT ON occurs, in the meantime they remain on the screen until overwritten or cleared.

PROTECT OFF 13H
Turns off the PROTECT SET or the PROTECT ON attribute. All characters which follow have no protection bit associated with them.

PROTECT ON 14H
Turns all characters with the PROTECT SET flag present, into a protected state. If new characters are written in this state they will not be protected. If any attempt is made to put the cursor into a protected field, the cursor will automatically move until an unprotected area is found. If all the screen is protected the cursor goes to the last position on the screen (character 80, line 24).

UNDERLINE ON 12H
All displayable characters which follow this control code are displayed with their UNDERLINE attribute bit set. 13H or 14H will reset the UNDERLINE attribute bit when displaying new characters.

BLINK ON 15H
All displayable characters which follow this control code are displayed with their BLINK attribute bit set.

X-Y ADDRESS 16H
Causes the next two characters after the initialising code to start the cursor positioning sequence.

These two characters will move the cursor firstly to an X co-ordinate and then to a Y co-ordinate.

The two co-ordinate characters are used only as co-ordinates, regardless of the normal significance of their code, as follows:

The most significant (Parity) bit is removed, leaving a 7 bit binary number. The value of space code (32 decimal, 40 octal) is subtracted from this number and the resulting value is used as the co-ordinate. The character move is made first, to the column given by the value, column 0 being the left hand one. Line 1 is the line under the STATUS LINE and line 24 (decimal) is at the bottom.

All co-ordinates 'out of range', ie. >= 80 (decimal) for the X co-ordinate, or >= 24 (decimal) for the Y co-ordinate; do not move the cursor for this 'out of range' co-ordinate.

Example:
To position the cursor at the third character of the second line (character 2, line 2) the sequence is:

026 (octal)	(X-Y ADDRESS)
042 (octal)	(") Co-ordinate value 2
041 (octal)	(!) Co-ordinate value 1

If the final cursor position is protected the cursor will skip to the next unprotected position or if there is no such position then it will go to the end of the screen (character 80, line 24). See CURSOR SKIP OPTION.

BLINK OFF 17H
All displayable characters that follow these control codes are displayed without their BLINK attribute bit set.

CURSOR RIGHT 18H
With Protect Off or Protect Set—Causes the cursor to move one position right; if the cursor is at the end of the line (character 79), then the cursor will move to position 0 on the next line.

If the cursor is at the end of the line on the last line (line 24), then the cursor will do one of the following:

(1) In PAGE mode—
The cursor moves to the home position.

(2) In ROLL mode—
A ROLL occurs (see LINE FEED) and the cursor moves to position 0 on the bottom line.

With Protect On—The cursor moves to the next position to the right: if the cursor moves into a protected field, then the cursor moves to the end of that protected field.

If the protected field goes to the end of the line, then the cursor moves to the next unprotected position on the next line.

If the protected field goes to the end of the page, then the cursor rests in character position 80, line 24.

DELETE TO END OF LINE 19H
Deletes all unprotected data from the cursor position to the end of the line.

SEND LINE 1AH
All characters from the cursor position (or beginning of the current line– option) to the end of the line are transmitted from the line port of the VDU.

If nulls are encountered on the line to be transmitted they may be ignored or sent as spaces (option).

Nulls to the end of line are always ignored.

After the last character on the line has been transmitted, or a TAB to the end of a line, then the terminators are sent. These are Carriage Return or Carriage Return and Line Feed (option). This is then the end of the SEND LINE sequence.

If the cursor in transmitting the bottom line is in ROLL mode, then the line feed terminator will cause a ROLL operation.

If in full duplex operation and an incorrect echo occurs while sending the printable characters, then a delete symbol '(see manual)' appears on the screen where the error occurred; the cursor remaining at the error position and the sequence is terminated.

In full duplex operation the transmission rate is determined not only by the Baud rate, but also by the 'echo rate'.

Note that in EDIT mode the send line code is not sent to line, but out of EDIT mode the send line code is sent to line.

ESCAPE 1BH
Is used as 'LEAD IN' code for selecting pages. See STATUS LINE.

SET ROLL MODE 1CH
Places the VDU in ROLL MODE. See Cursor Movements.

CURSOR HOME 1DH
Places the cursor in the top left hand corner of the display. If a protected field is at this position, the cursor may remain there or skip, depending on the CURSOR SKIP OPTION.

SET PAGE MODE 1EH
Places the terminal in PAGE MODE. See Cursor Movements.

CLEAR 1FH
Clears all unprotected data from the Home position, or from the cursor (see OPTION PAGE), to the end of the screen.

STANDARD CONTROL CODE SET

FUNCTION	PRESS CONTROL KEY WITH	OCTAL	HEX
NULL	@	000	0
INSERT LINE	A	001	1
DELETE LINE	B	002	2
RQST X-Y CO-ORDS	C	003	3
ANSWER BACK	D	004	4
BACKGROUND ON	E	005	5
BACKGROUND OFF	F	006	6
BELL	G	007	7
BACKSPACE (cursor left)	H	010	8
TAB	I	011	9
LINE FEED (cursor down)	J	012	A
CURSOR UP	K	013	B
TRANSMIT PAGE	L	014	C
CARRIAGE RETURN	M	015	D
DELETE CHARACTER	N	016	E
INSERT CHARACTER	O	017	F
PRINT ON	P	020	10
PRINT OFF	Q	021	11
SET ATTRIBUTE	R	022	12
ATTRIBUTE OFF	S	023	13
ATTRIBUTE ON	T	024	14
BLINK ON	U	025	15
X-Y IDENTIFIER	V	026	16
BLINK OFF	W	027	17
CURSOR RIGHT	X	030	18
DELETE TO END OF LINE	Y	031	19
TRANSMIT LINE	Z	032	1A
ESCAPE	[	033	1B
SET ROLL MODE	\	034	1C
CURSOR HOME	]	035	1D
SET PAGE MODE	^	036	1E
CLEAR SCREEN	_	037	1F

Fault Finding

Should a fault be suspected on the VDU the following proceure should be followed:

(1) Switch off the machine and check fuses at rear of machine and in 13A plug.

(2) Switch on, check contrast is 'turned up'.

(3) Place the machine in half duplex, press control and G, a bell should sound; this would suggest the basic machine is working but there may be a video fault if no picture is observed.

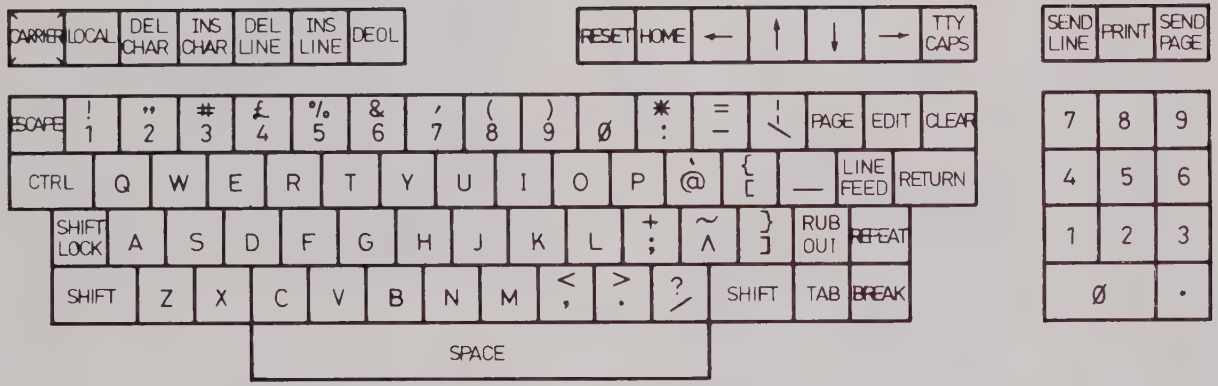
(4) If the machine appears to operate off-line but not on-line, check that the speeds and the duplex are in the correct settings. An '!' is displayed if the parity of the received data is not as selected.

(5) If working with V24 and no communication with the CPU is observed, in order to check that data is being sent out and received correctly: place the machine in full duplex, on-line but not connected to any other equipment, short the RXD modem pin to the TXD modem pin (pins 3 and 2 on 25-way 'D' type plug); on depressing keys the corresponding captions should appear on the screen. Note the TX and RX speed settings must be identical.

(6) Any other faults could be connected with 'handshakes' not being used correctly.

(7) If a picture is present but no response is observed from the keyboard, press the repeat key; if a caption appears on the screen, the corresponding key could be 'jammed' down.

If no success is reached using the above guidelines please ring Newbury Laboratories' Service Department, stating as clearly as possible the problems.

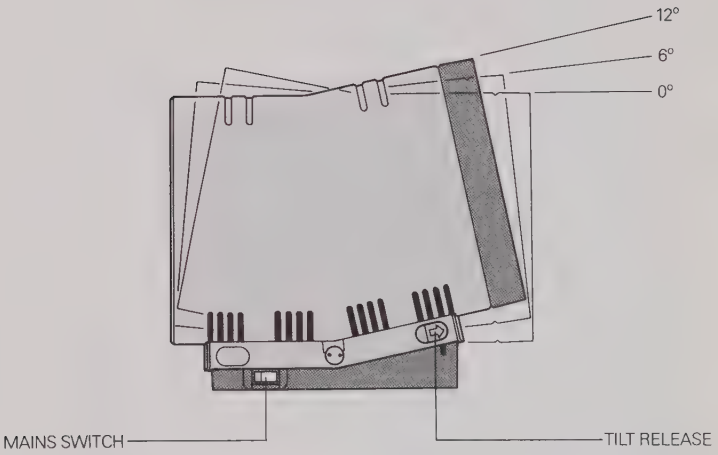


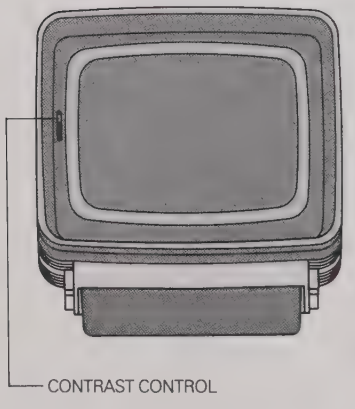
NOTE

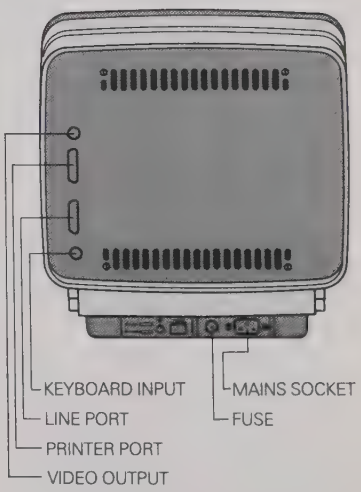
£ OVER 4 UK ONLY
OTHERWISE $ OVER 4

MODEL 8009

NEWBURY 8000 SERIES







Warranty, Maintenance and Service Facilities

The equipment described herein is covered by the standard Newbury Laboratories Ltd. warranty, as stated on our official order acknowledgement. Please note for your own reference the warranty and maintenance terms applicable.

Warranty Period	Months From:	To:
Maintenance Period	Months From:	To:
VDU Type:	Serial No:	

Any queries concerning maintenance should be addressed to:

UK Service Centre
Arnhem Road
Newbury
Berkshire RG14 5RU
Tel: (0635) 48864

MP MASTER
MA23745